REMARKS / ARGUMENTS

Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 1-7 are pending; Claims 1, 2 and 3 are amended; and Claims 4-7 are newly added. The amendments to Claims 1, 2, and 3 are merely for clarification. Support for the newly added Claims 4, 5, and 7 can be found at page 3, lines 15-22, of the specification, for example; and support for newly added Claim 6 can be found at page 14, line 2-page 15, line 5, for example. No new matter is added.

Claims 1 and 2 were rejected under 35 U.S.C. § 103(a) as obvious over Ikuji (Japanese Patent No. 62-205635, hereafter "Ikuji") in view of Kaihara et al. (U.S. Patent No. 6,140,906, hereafter "Kaihara"); Claim 3 was rejected under 35 U.S.C. § 103(a) as obvious over Ikuji in view of Tanaka et al. (U.S. Publication No. 2004/0027502, hereafter "Tanaka").

At the outset, Applicants acknowledge with appreciation the courtesy of the February 4, 2005 personal interview extended by Primary Examiner Long Pham to Applicants' representatives. During the personal interview, Applicants discussed whether Kaihara describes brazing configured to dissipate heat, the meaning of "pressure contact," and whether Tanaka describes electrodes directly connected to other electrodes.

Applicants note that no English translation of Ikuji has been provided in the outstanding Office Action. MPEP § 706.02 II makes clear that if a rejection is based on English Abstract of a foreign language reference, a full English translation of the reference shall be supplied to the Applicants in the next Office Action. Additionally, any Final rejection may not rely on the Abstract of a foreign language reference unless the Applicants are provided with a full English translation of the foreign language reference.

Before treating the rejection of Claims 1 and 2 as obvious over Ikuji and Kaihara, Applicants believe that a brief review of the present invention would be helpful.

Semiconductor devices generate heat during normal operation. If the heat generated is not well dissipated, the temperature of the semiconductor device may increase enough to cause the materials of the semiconductor device to degrade and eventually fail. One mode of failure caused by elevated temperature is current leakage due to a reduction in band gap.[1] Such leakage causes a semiconductor switch to fail to fully turn off even if no signal voltage is applied to turn the switch on. The most common material used in semiconductor devices is silicon. Recently, however, the use of a single semiconductive element, such as silicon, has been replaced by compound semiconductive materials with better stability when heated. Such compounds include, for example, silicon carbide, gallium arsenide, and gallium nitride. These materials have a higher band gap width and resist current leakage despite the narrowing effect on band gap caused by elevated temperature.

Use of compound semiconductive materials reduces the problem of current leakage that occurs when operating a semiconductor device at higher temperatures. However, conventional epoxy sealing material used to encapsulate a semiconductor device may decompose when the semiconductor device reaches a temperature higher than about 200° C. Thus, conventional sealing materials fail to perform well enough to accommodate the higher operating temperatures achievable with compound semiconductor materials.

In light of these difficulties, Applicants developed the present invention, as recited, for example in Claim 1. Amended Claim 1 recites, in part, "a plurality of main electrodes, at least some of the main electrodes being provided on each of at least two different main surfaces of the semiconductor chip."

In contrast, Ikuji describes a chip directly located on a substrate (1) with electrodes (3) connected only to one surface.[2] As discussed in the personal interview, all electrical connections (3) described in Ikuji are shown on top of the chip (2), and none are shown

[1] Band gap is the amount of energy required to move an electron from one shell (orbit) to another. Increased temperature reduces the band gap.
[2] Ikuji, Abstract, Figs. 1 and 2.

between the chip (2) and substrate (1) or any other surface. Therefore, Ikuji does not disclose the claimed feature of at least some of the main electrodes being provided on at least two different main surfaces of the semiconductor chip. As the plural term "surfaces" is a part of the original independent claims, Applicants respectfully submit that the present amendment is cosmetic and merely further clarifies the previous features of Claim 1.

The Office Action relies on Kaihara to provide the feature of a silver brazing member. However, Kaihara does not remedy the above-discussed deficiency in Ikuji. Kaihara relates to a multi-layered temperature sensor and does not disclose a plurality of main electrodes with at least some of the main electrodes being provided on each of at least two different main surfaces of the semiconductor chip, for example.

Additionally, neither Ikuji nor Kaihara discloses a semiconductor chip of a **wide gap** type. As noted above, conventional semiconductor materials, such as silicon, become electrically unstable at higher operating temperatures. Integrated circuits made with wide band gap materials, such as silicon carbide, and gallium nitride, are more stable at higher temperatures than, for example, chips made with conventional silicon material. Ikuji fails to disclose what material is used to make the chip described in the English Abstract. Nowhere in the English Abstract of Ikuji is band gap discussed. As further discussed above, Kaihara is concerned with a temperature sensor, not an integrated circuit. Additionally, Kaihara does not describe any materials as wide gap materials. Therefore, Applicants respectfully submit that Ikuji and Kaihara fail to disclose every element of amended Claim 1 for at least the reasons discussed above.

Applicants also respectfully submit that Kaihara is directed to a resistive temperature sensor for detecting high temperatures of 1000° or more. In contrast, Claim 1 is directed to a semiconductor device using a sealing member made of a glass based sealing material. Therfore, Applicants respectfully urge that because the field, construction, and object of the present invention is different from those of Kaihara, no motivation to combine Kaihara with

Konishi exists. Accordingly, Applicants submit that this is yet another reason Claim 1 patentably distinguishes over the cited references.

Accordingly, Applicants respectfully request withdrawal of the rejection of amended Claim 1. Additionally, as amended Claim 2 depends from amended Claim 1, Applicants submit that Claim 2 patentably distinguishes over the cited references for at least the same reasons as amended Claim 1.

Further regarding Claim 2, the outstanding Office Action states that Kaihara teaches connecting two conductors by silver based brazing material to allow the device to work in high temperature environments. However, Applicants respectfully note that that Kaihara merely describes lead members (41) and (42) as joined to the nickel plating portions of the electrode sections by silver brazing.[3] Nowhere in Kaihara is the brazing material disclosed as configured to dissipate heat. Accordingly, Claim 2 also patentably distinguishes over the cited references for this additional reason.

Regarding the rejection of Claim 3 as obvious over Ikuji in view of Tanaka, that rejection is respectfully traversed.

Amended Claim 3 recites, in part, "a plurality of main electrodes, at least some of the main electrodes being provided on each of at least two different main surfaces of the semiconductor chip...wherein the semiconductor chip is of a wide gap type"

[3] See Kaihara, col 1. lines 5-10; col. 24, lines 50-60; and Fig. 8D.

As discussed above, Ikuji discloses neither of these features. The outstanding Office Action relies on Tanaka for the feature of connecting main electrodes directly to external electrodes. However, Tanaka does not remedy the above-discussed deficiencies in Ikuji. Tanaka is concerned with a liquid crystal display with antistatic protection. Nowhere in Tanaka are wide band gap materials or a plurality of electrodes on different surfaces of a semiconductor chip disclosed.

Claim 3 also requires the plurality of external electrodes to be in direct contact with and electrically connected to the main electrode by pressure contact, a further feature not taught or suggested by the applied reference. Accordingly, for at least these reasons, Applicants respectfully submit that Ikuji and Tanaka, either alone or in any proper combination, fail to disclose every element of amended Claim 3. Therefore, Applicants respectfully request withdrawal of the rejection.

As new Claim 4 depends from amended Claim 1, and new Claim 5 depends from amended Claim 3, Applicants respectfully submit that Claims 4 and 5 patentably distinguish over the cited references for at least the same reasons as amended Claims 1 and 3, respectively.

Newly added Claim 6 recites substantially similar features as Claim 3 rewritten in means plus function format. Therefore, Applicants respectfully submit that newly added Claim 6 patentably distinguishes over the cited references for at least the same reasons as amended Claim 3. Claim 7 depends from Claim 6 and should be considered allowable for the same reasons as Claim 6.

Consequently, in view of the present amendment and in light of the above discussion, the outstanding grounds for rejection are believed to have been overcome. The application as amended herewith is believed to be in condition for formal allowance. An early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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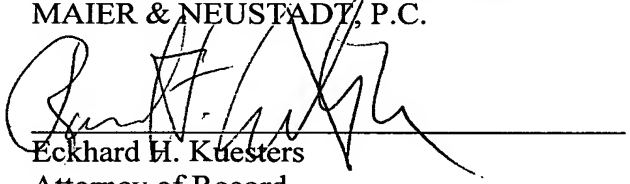

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